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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,098	10/27/2003	Gerald A. Raitzer	2003P14310US	3106

7590 09/22/2006

Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, NJ 08830

EXAMINER

JAWORSKI, FRANCIS J

ART UNIT	PAPER NUMBER
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3768

DATE MAILED: 09/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,098

Applicant(s)

RAITZER ET AL.

Examiner

Jaworski Francis J.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 14-18 and 20-24 is/are rejected.
- 7) ☒ Claim(s) 12, 13 and 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10-27-03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

The specification is queried regarding the following features:

[The Examiner's purpose here is to establish the scope for interpretation of the claims, since the specification often presents alternative implementation information with respect to the features which affects interpretation of the claims.]

1) Beamformer-based scan position compensation - At least some portions of the specification seem to suggest that in order to compensatorily adjust scanline position for velocity variations, one may temporally re-set the transmit/receive departure/arrive time of the centerline of a component planar scan to be 'centered' within the small increment of changing displacement within which the planar frame is fired, or effectively shrink or expand the frame acquisition interval so that the total frame gathering time proportions to the mechanical sweep speed to thereby put a limit on out-of-plane error for the frame, or the compensation may be accomplished by writing the data to a voxel grid in its true position as determined from the sweep encoder or pre-calibration. This appears to expand the scope of what a beamformer does per applicants' para [0017] description, since applicants describe a linear array in which all steering and focusing occur crosswise to the elevational movement. The Examiner is therefore viewing element 14 as a receive system which includes a beamformer and is not construing any scan position setting to literally confine to a beamformer for purposes of art application unless specifically recited.

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2) Scan position adjustment or compensation – These terms can literally refer to the action of a servomotor system in which the scan motor is sped up or slowed down by sensing a velocity parameter in feedback of current actual position (i.e. closed loop control), and the mechanical movement is slaved to a master program control.

Whereas applicants do use a motor controller and a closed loop, there does not appear to be disclosure of servomotor operation, and 'scan position adjustment' is confined to electronic compensations apart from motor regulation. For purposes of claim interpretation however, the Examiner considers servomotor controls as within the broadest reasonable interpretation of for example the latter half of claim 1 since one can certainly correct scan position by retarding or advancing the motor mechanism which is delivering the array to that position.

3) Relation of open-loop to closed loop - It is unclear whether these are true alternatives – Figure 2 shows a dotted feedback path from 18 – 14 whereas Fig. 3 shows stored profiles and measured profiles 32, 34 as present together. It appears that both are usable together, meaning that a stored characteristic profile for a given sweep speed might be compared with actual position encoded feedback in the face of loading of the scan probe by physical contact with the patient or thermal variation in couplant viscosity, and so the Examiner is presuming such. There is a possibility that a drawing modification might be needed.

4) Location of the probe and rotation directions – intravascular (IVUS) probes and endoscopes may have probe tip mechanically rotatable single transducers or axial arrays usually unidirectionally rotated and subject to rotational lag due to torsion of the

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drive cable (if a tip motor isn't used) such that start time will vary and be problematic for absolute orientation of a radial image reference on a display.. Body surface linear array probes may be wobbled in the sense of swept to and fro to create a cubic volume (no array rotation) or rotated to create a pie-wedge sector in 3-D. Although portions of the specification mention angular rotational velocity suggestive of the latter, the Examiner is construing 'wobble' or 'rocked' to pertain to the back and forth motion of pure translation as well as pure rotation unless otherwise limited, and the probe proper to be in-body (endoscopic or catheter) or body surface or water-bath coupled. The specification does not appear to address nor the claims to claim so as to embrace unidirectional rotation positional errors since 'mechanically rocked' is a term in each base claim, albeit that a position sensing act may pertain to or associate with a scan position position setting activity within a unidirectional portion of a back-and-forth scan.

6) Broadest claims do not confine to imaging or to medical ultrasound, since a beamformer or scan may occur in relation to array –based distance mapping for scanning radar for example, and therefore no such imaging or ultrasound limitations are to be 'read in' by the Examiner.

6) Velocity/velocity parameters - Specification para [0025] states that a number of velocity related parameters may serve to effect act 36 and set scan positions. Claim 1 however claims 'determining...velocities'. Hence a reasonable person might conclude that only linear or angular velocity determinations not speed or acceleration or such are embraced, while another reasonable person might point to the para [0025] and conclude that the claim pertains to any velocity-related parameter from which

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incremental position change with incremental time lapse may be inferred. Since this terminology does represent a claim clarity issue the claims are formally objected to.

Claims 1 – 24 are objected to because of the following informalities: Lack of clarity re velocity/velocity parameters. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 – 7, 11, 20 – 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Mochizuki et al (US5152294) and Shimizu (US4579122). The former is directed to inter alia scan position adjustment by control of

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scanline read to memory locations for a mechanically rocked linear array for volume scanning however by using angle sensing. Shimizu like Mochizuki also entertains servomotor control as an alternative or additional mechanism for correcting for uneven scanning speed and stores at least a corrective equation and speeds via inter alia 88 for forward and reverse scans and suggests tracking literal angular velocity or angular position change with time to achieve same. Therefore either may serve as a base reference in combination with the other to achieve the mechanically rocked array-scan position settings - (angular) velocity – based.

Claims 8 – 10 and 14 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mochizuki et al and Shimizu as applied to claims above, and further in view of Dunham (US6080108). Whereas the former do not specifically mention a beamformer or control of transmit portions to achieve scan position regularity, it would have been obvious in view of the latter to do so in order to achieve a uniform volume scan.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mochizuki et al and Shimizu, further in view of Dunham as applied to claims above, and further in view of Verdonk et al (US5485845) since it would have been obvious in view of the latter to adjust scan start times in association with angular rotational lag information in order to properly position scan data.

Allowable Subject Matter

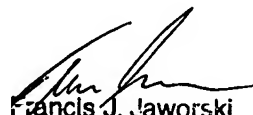
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Claims 12 – 13 and 19 are objected to as being dependent upon a rejected and objected to base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication should be directed to Jaworski Francis J. at telephone number 571-272-4738.

FJJ:fjj

120906



Francis J. Jaworski
Primary Examiner